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## A Mathematical Model to Study the Crime Dynamics Spread within Minority Communities

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**Presenter Information**

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Title: A Mathematical Model to Study the Crime Dynamics Spread within Minority Communities  
Authors: Maila Brucal-Hallare, Beatriz Cuartas, Anne Fernando, and Ana Vivas-Barber

It is known that criminality is a social phenomenon that can be spread within social communities who share a common demographic identity that includes race, ethnicity, economic opportunity, education, and political socialization. Further, relevant literature indicates that criminality and re-incarceration can be largely attributed to structural social disparities embedded in the legal, political, and economic institutions. This paper aims to provide an understanding of this social science issue from a mathematical standpoint. We develop a model for crime and incarceration population flow dynamics using compartmentalized modelling methods. Assume that the total population is divided into five compartments with S: Susceptible (no criminal behavior);  $E_1$ : Latent 1 (criminal behavior, never-incarcerated);  $E_2$ : Latent 2 (repeat offenders); I: infectious (incarcerated), and R (recovered). In the analysis, we compute the reproduction number, the disease-free equilibrium, and the endemic equilibrium. Additionally, some stability results are obtained and simulations are performed using data for the most infected population sectors made up of racial and ethnic minorities. The results reinforce the findings that crime and incarceration rates are associated with structural inequalities stemming from racial prejudice towards minority communities.